

SELF-CENTERING SKATE HOLDER

FIELD OF THE INVENTION

[0001] The present invention relates to skate holders for use with skate sharpening machines.

DESCRIPTION OF THE PRIOR ART

[0002] Skates used in activities such as hockey, figure skating, speed skating and for leisure include a boot and a blade. The blade is attached to the bottom of the boot and is used to 'dig into' an ice surface allowing the skater to glide along the ice due to the opposing force imparted on the skater when pushing against the ice surface. To effectively grip the ice surface, the blade includes a concave surface at its lowermost edge. This concave surface, commonly known as a 'hollow ground', produces two parallel edges opposed about the centreline of the hollow ground. Through repeated contact with the ice surface, the edges are worn down due to friction with the ice surface and periodically need to be sharpened.

[0003] Sharpening a skate blade involves restoring the sharp edges of the skate blade by bringing the dull edges into engagement with the convex radius of the face of a grinding wheel and applying pressure. This allows the grinding wheel to grind the blade in a manner that restores the previously achieved sharp edges with two parallel edges. A proper sharpening requires that the centreline of the hollow grind be in a similar plane as the centreline of the convex radius of the grinding wheel. This is achieved by maintaining the skate blade in the proper orientation and at the proper height.

[0004] Typically, a skate sharpening grinding wheel is horizontally oriented so that its axis of rotation is perpendicular to the table on which it is mounted. With the grinding wheel parallel to the table, the skate blade must be held with its outwardly facing edges parallel to the grinding table and the concave surface of the blade held at an identical level as the convex radius of the grinding wheel. To maintain this orientation, a holder is required which typically includes a

1 clamping mechanism to maintain the skate in the proper position for the duration of the
2 sharpening procedure.

3
4 **[0005]** A skate holder with a clamping mechanism is shown in a United States Patent No.
5 4,078,337 to Chiasson et al. The skate blade is placed with one outwardly facing surface against
6 a stationary jaw. The opposing jaw is lowered against the other outwardly facing surface and
7 tightened to secure the skate in place. The stationary jaw is positioned so that a particular blade
8 in the proper alignment with the convex radius of the grinding wheel. By securing the skate
9 blade between a clamping jaw and a stationary jaw, any blade that is clamped would be held at a
10 similar level. Since the thickness of a skate blade may vary between different skate models and
11 different skate types, this type of clamping mechanism does not ensure that the centrelines of the
12 hollow ground and convex outer radius of the grinding wheel are aligned properly. A misaligned
13 blade will of course impart an uneven sharpening due to the off-center grinding from the
14 grinding wheel.

15
16 **[0006]** To ensure the centrelines of the hollow grind and convex outer radius of the grinding
17 wheel are properly aligned, self-centering skate holders have been developed. To achieve self-
18 centering, the clamping mechanism allows both jaws to approach the blade from their respective
19 sides. By moving identical distances during the clamping operation, no matter the thickness of
20 the blade, the centerline will be properly aligned. A self-centering skate holder is shown in a
21 U.S. Patent No. 4,055,026 to Zwicker and similarly a U.S. Patent No. 6,422,934 to Blach et al..
22 The clamping arms in these designs are pivoted about an axis located a distance behind the point
23 of clamping and consequently behind the boot and the blade. This arrangement creates a large
24 area for the skate to be placed. While this design achieves self-centering, the location of the
25 pivot axis renders a large and bulky apparatus. To achieve a proficient sharpening, it is
26 beneficial for the user to have full control of the skate holder. The user must guide the holder
27 towards the grinding wheel, therefore a large and bulky design is not desired.

28 **[0007]** It is therefore an object of the present invention to obviate or mitigate at least one of
29 the above mentioned disadvantages.

1 SUMMARY OF THE INVENTION

2 [0008] In one aspect a self-centering skate holder is provided comprising a base, a mounting
3 plate secured to said base and having an elongated slot therein to receive a blade of a skate, a pair
4 of jaws located on said mounting plate on opposite sides of said slot and moveable relative to
5 one another to engage opposite sides of said blades, and an operating mechanism connected to
6 each of said jaws and operable to move said jaws conjointly from an open position to a closed
7 position whereby said jaws remain equally spaced to opposite sides of a datum during such
8 movement.

9
10 [0009] Preferably the operating mechanism is supported on the plate and includes a flexible
11 tensile member to transfer movement of one jaw to the other.

12
13 BRIEF DESCRIPTION OF THE DRAWINGS

14 [0010] These and other features of the preferred embodiments of the invention will become
15 more apparent in the following detailed description in which reference is made to the appended
16 drawings wherein:

17 [0011] Figure 1 is a perspective view of a skate sharpener and skate holder;

18 [0012] Figure 2 is a perspective view of the skate holder of figure 1.

19 [0013] Figure 3 is a front view of the skate holder shown in Figure 1;

20 [0014] Figure 4 is a rear view of the skate holder shown in Figure 1;

21 [0015] Figure 5 is a section on the line IV-IV of Figure 3;

22 [0016] Figure 6 is a perspective view of components of the holder of Figure 2;

23 [0017] Figure 7 is an exploded view of a portion of the holder of Figure 2;

24 [0018] Figure 8 is a partial view of the upper and lower clamping jaws moving between open
25 end closed positions with a skate blade disposed between.

26 [0019] Figure 9 is a front view of a further embodiment of a component used in the skate
27 holder of Figure 1.

28 [0020] Figure 10 is a perspective view of an alternative embodiment of a skate holder.

29 [0021] Figure 11 is a view on the line XI-XI of Figure 10.

1
2 DESCRIPTION OF THE PREFERRED EMBODIMENTS

3 [0022] Referring therefore to Figure 1, a skate sharpening apparatus 10 includes a skate
4 holder 12 that supports a skate 14 having a skate blade 15. The holder 12 is slideable on a work
5 surface 18 so as to be manoeuvrable past a grinder 16 having a grinding wheel 20. The grinding
6 wheel 20 is positioned to rotate about a vertical axis in a horizontal plane and, upon engagement
7 with the blade 15, to grind the requisite profile.

8
9 [0023] The details of the holder 15 can be seen in more detail in Figures 2 through 7. The
10 holder 12 has a base 22. A pair of handles 26 are provided on the base 22 to facilitate
11 manipulation of the holder 12 on the worktop 18. A mounting block 28 is secured to an upturned
12 lip 24 of the base 22 by bolts 30. The position of the mounting block 28 relative to the base is
13 adjusted by means of set screws 32 which are threaded into the base 22 and bear against the
14 underside of the mounting block 28. The set screws 32 provide a nominal or coarse adjustment
15 for the disposition of the mounting block 28 relative to the base 22 to ensure alignment between
16 the holder 12 and the base 22.

17
18 [0024] The mounting block 28, has an open ended slot 34 at each end in which a pair of cam
19 members 42 are mounted. Each of the cam members 42 are mounted on threaded pivot bolts 44
20 secured to the lower edge of a mounting plate 40. The cam members 42 provide an outer surface
21 that is eccentric to the bolts 44 and have a radial handle 46. The cam member 42 is dimension to
22 be a close fit within the slot 34 such that rotation of the cam member 42 on the bolts 44 provides
23 relative vertical adjustment between the plate 40 and the mounting block 28. This arrangement
24 provides a fine alignment of the plate 40 relative to the base 22 with the locking bolts 30
25 clamping plate 40 to the mounting block 28 after the required alignment has been achieved.

26
27 [0025] The plate 40 has a planar central portion 50 and curved end portions 52. An elongate
28 slot 54 extends through the central portion 50 into each of the end portions 52 and is
29 dimensioned to receive the blade 15 of a skate with adequate clearance to accommodate different

1 sizes and thicknesses. A pair of jaws 56, 58 are slideably mounted on the central portion 50 and
2 are moveable by an operating mechanism 60 between an open position in which the slot 54 is
3 relatively unencumbered and a closed position in which the jaws 56, 58 engage the skate blade 15.
4 Referring again to figures 4 to 7, the jaws 56, 58 each have a pair of slots 62 that receive a guide
5 pin 64 secured to the mounting plate 40. The guide pin 64 is a sliding fit within the slot 62 and
6 therefore constrains the jaws 56,58 for movement in a direction perpendicular to the axis of the
7 slot 54.

8
9 **[0026]** The upper jaw 56 has a follower recess 66 formed between the slots 62 to receive a
10 cam 68. The cam 68 is a close fit within the recess 66 and is secured by a retainer 70 to an
11 actuator spindle 72 for rotation with the spindle 72. The spindle 72 is rotatably mounted in the
12 support plate 40 and is secured at its opposite end to a lever 74.

13
14 **[0027]** The lever 74, which forms part of the operating mechanism 60, has a cable 76 secured
15 to it by a fastener 78 at a location spaced from the spindle 72. The cable 76 is entrained within a
16 recess 77 extending around the periphery of the plate 40 by a set of guide pulleys 80 each of
17 which is rotatably secured to one of the end portions 52 adjacent to corners of the guide plate 40.
18 The cable 76 also runs through slides 82 positioned between the pulleys 80 and jaws 56, 58 to
19 cause the cable 76 to conform generally to the curvature of the end portions 52. The length of
20 cable 76 may be adjusted by a threaded connector 79 so that the cable is taut around the pulleys
21 80.

22
23 **[0028]** The cable 76 is attached on its lower run to a pair of actuating arms 84, each of which
24 is secured to respective spindles 86. The spindles 86 extend through the mounting plate 40 and
25 are connected to respective ones of a pair of cams 88. The cams 88 are located within respective
26 follower recesses 90 in the lower jaw 58, similar to the recess 66, and the jaw 58 is retained by a
27 retainer 92 secured to the spindle 86 to ensure the cams 88 rotate with the spindles 86.

1 [0029] In operation, the mounting plate 40 is adjusted relative to the base 22 using the
2 mounting block 28 such that the longitudinal axis of the slot 54, which acts as a datum, is aligned
3 with the plane of the grinding wheel 20 and is positioned on the center line of the wheel 20. The
4 skate blade 15 is then inserted into the slot 54 and the handle 74 rotated to move the jaws 56, 58
5 into engagement with the blade 15. As the handle 74 is rotated, the cam 66 is likewise rotated
6 and causes the jaw 56 to move inwardly toward the blade 15. The movement of the handle 74 is
7 also transmitted through the cable 76 to each of the actuating arms 84. The spindles 86 are thus
8 rotated causing the cam 88 to cause a corresponding displacement of the jaw 58 toward the blade
9 15. The jaws 56, 58 are thus brought into engagement with the blade 15 so that the blade 15 is
10 held securely between the jaws and in alignment with the wheel 20.

11
12 [0030] It will be apparent that the attachment points of the cable 76 to the handle 74 and the
13 actuating arms 84 are chosen such that an equal and opposite displacement of the jaws 56, 58 is
14 obtained. This ensures that the blade 15 is maintained on the center line of the slot 54 in
15 alignment with the wheel 20 as the jaws are moved into the clamping position. Accordingly,
16 different thicknesses of blade can be accommodated without adjusting the disposition of the slot
17 relative to the plane of the wheel 20.

18
19 [0031] With the blade 15 secured, the base 22 can be manipulated to bring the blade into
20 engagement with the wheel 20 and grind the required profile onto the edge of the blade 15. After
21 the grinding is complete, the handle 74 is simply rotated in the opposite direction to release the
22 jaws 56, 58 and permit removal of the blade. It will be noted that the operating system 60 is
23 contained on the plate 40 and thus allows unencumbered access to the skate during sharpening.

24
25 [0032] The eccentricity of the cams is selected such that, over the typical range of blade
26 thicknesses, the engagement between the cams and the respective recesses is essentially self
27 locking. Thus, after the handle 74 is moved to bring the jaws into the clamping position, the
28 handle may be released and the jaws will remain engaged with the blade.

1 [0033] It is found that the entrainment of the cable 76 over the pullies ensures a free
2 movement of the cable to ensure that conjoint movement of the cam members is obtained.
3 Whilst the routing of the wire within a sheath might also be used, it is believed that the
4 entrainment around the pullies inhibits potential binding with the sheath.

5
6 [0034] It will of course be appreciated that the handle 74 may be separated from the
7 actuation of the cam so that the handle may be at either end of the support plate 40 and operate
8 the cam through an arm similar to that used on the lower jaw 58.

9
10 [0035] In certain circumstances the forces applied to the jaws 56, 58 through the operating
11 mechanism 60 may be sufficient to deflect the upper portion of the mounting plate 50 which in
12 turn could result in the blade not being exactly centered . A further embodiment of mounting
13 plate is shown in Figure 9 in which like components will be shown with like reference numerals
14 with a suffix a added for clarity.

15
16 [0036] Referring therefore to Figure 9, a mounting plate 50a has a central slot 54a and a
17 peripheral groove 77a. It will be understood that the operating mechanism and jaw are mounted
18 on the mounting plate 50a in a manner similar to that described above. Similarly, the plate 50a
19 may be secured to a mounting block 28a by bolts 44a located on the lower edge of the plate 54a.

20
21 [0037] An elongate slit 100 is formed on the opposite side of the recess 77a to the slot 54a.
22 The slit 100 is placed above the block 28a and extends parallel to and over substantially the same
23 length as the slot 54a. The slit 100 is spaced from the lower edge of the slot 54a by a distance
24 (indicated 'x') corresponding to the spacing of the upper edge of the slot 54a from the top edge
25 of plate 54a.

26
27 [0038] The provision of the slit 100 and its placement relative to the lower edge of the slot
28 54a provides a pair of beams 102, 104 of substantially similar dimensions that support the
29 operating mechanism 60. The forces induced by the engagement of the jaws 56a, 58a with the

blade are thus reacted by a similarly dimensioned support and the deflection of each of the supports is similar. Thus, the blade remains centered within the slot and variations in the load supplied through the cam mechanism to the jaws will cause equal and opposite displacement of the support portions of the plate 50a to maintain the required alignment.

[0039] In the above embodiments shown in Figures 1 through 9, the skate holder 12 may accommodate blades of different configurations but may be either solid or with cut outs. However, a substantial number of blades intended for ice hockey use are provided with the central portion of the blade removed which provides the opportunity for a simpler clumping mechanism as shown in Figures 10 and 11. In the embodiment of Figures 10 and 11, like components will be identified with like reference numerals with a suffix b added for clarity.

[0040] Referring therefore to Figure 10, the skate holder 12b has a mounting block 28b on which is supported a mounting plate 50b. The mounting plate 50b has an elongate slot 54b and a parallel spaced slit 100b as described above with respect to Figure 9. Adjustment of the mounting plate 54b relative to the base 22b is accomplished as described above with respect to Figures 1 through 8 so that the slot 54b is aligned with the datum as required.

[0041] The jaws 56b, 58b are secured to the upper and lower beams 102b, 104b by set screws 106. The jaws 56b, 58b are thus fixed to the beams for movement with them.

[0042] The operating mechanism 60b includes a yolk 106 secured to the upper beam 102b. The yolk has a channel 108 with a cam 66b mounted within the channel for rotation on the pivot 72b. A handle 74b is secured to the pivot 72b to effect rotation of the cam within the channel 108.

[0043] A follower 110 engages the surface of the cam 66b and is supported in a bar 112. The bar 112 is slidably supported in the yolk 106 with the terminal portion extending across the

1 channel 108. The follower 110 is threaded into the terminal portion 114 so that it may be
2 adjusted relative to the cam 66b.

3 [0044] The lower end of the bar 112 is secured to a block 116 mounted on the beam 104b. In
4 operation, the blade is inserted between the jaws 56b, 58b with the bar 112 removed. The bar is
5 then inserted into the blocks 116 and yolk 106 and secured to the block 116. The follower 110 is
6 then adjusted so as to be slightly clear of the cam 66b and the handle 74b used to rotate the cam
7 66b within the channel 108. The eccentricity of the cam 66b causes the bar 112 to be displaced
8 and apply a force between the beams 102b, 104b. As the beams have substantially identical
9 cross section, the deflection of each of the beams is the same and the jaws 56b, 58b move into
10 engagement with the blade to maintain it on the datum. After sharpening of the blade, the cam
11 66b is released, the bar 112 removed and the skate removed from the slot 54b.

12
13 [0045] The arrangement shown in Figures 10 and 11 maintains the jaws 56b, 58b equally
14 spaced from a datum. The mechanism 60b is relatively robust and may readily be used where
15 the configuration of the blade permits the passage of the bar 112. It will also be appreciated that
16 the mounting plates 50b can readily be removed and replaced with the alternative configuration
17 of mounting plate such as that shown in Figures 1 through 8 or Figure 9 to allow a full range of
18 blades to be sharpened.